

A SECRET IMAGE EMBEDDING TECHNIQUE FOR 2D BARCODE IN VIDEO

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ABSTRACT

Security and copyright protection are becoming important issues in multimedia applications and services. Digital picture embedded and extraction is a technology used for copyright protection of digital media. Here possession data knowledge known as QR-image (2D) is embedded into the digital media while not poignant its sensory activity quality. In case of any dispute, the second knowledge may be detected or extracted from the media and use as an indication of possession. This project proposes a replacement video-embedding second barcode, known as Video-PiCode that mitigates these 2 limitations by mobilization a scannable second barcode with an image sequence look. Video-PiCode is meant with care issues on each the sensory activity quality of the embedded video and also the secret writing strength of the encoded message. Comparisons with existing phase I techniques show that Video-PiCode achieves one among the most effective sensory activity embedded video, and maintains an improved trade-off between video quality and secret writing strength in varied application conditions. PiCode has been enforced in Matlab on a computer and a few key building blocks have conjointly been ported to platforms. Its usefulness for real-world applications has been with success incontestable.

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INTRODUCTION

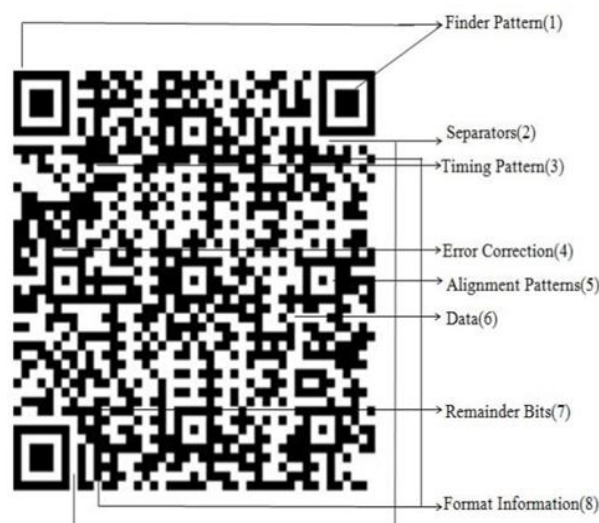
In two-dimensional (2D) barcodes are a unit wide employed in the promotion business as a bridge to link the offline and on-line contents. In such associate degree application, a Two dimensional barcode cryptography a product promotion net link is usually hooked up to a poster to interact dimensional barcode capturing and coding device. Potential customers will handily retrieve more info concerning a poster by scanning the barcode with their mobile phones. These methods merely involve initiating appropriate barcode scanning mobile computer code and inform the phone camera towards the barcode. It's a lot of advanced bar writing; the barcode is a computer readable optical label that contains info concerning the item that it's connected.

QR codes work on the barcode technology and consists of the black square. dots on white background. Its pattern is in black and white, and consists of some giant? Axed patterns that are designed to ensure detection and coding hardiness. QR code contains Three squares under patterns set at the highest left, high right and bottom left corners, severally, associate degree alternating black and white temporal arrangement pattern between adjacent under patterns, also as a smaller square alignment pattern at rock bottom right region.

Whereas data in a 1D barcode is kept and skim horizontally solely, second barcodes store data each vertically and horizontally. The lines of a 1D barcode therefore become dots, or pixels, in 2D. Consequently, second barcodes square measure ready to store way more information and communicate way more difficult tasks at intervals a smaller physical space, although clearly they need increased scanning instrumentality. A recent report shows that the scanning volume of a picture-embedding QR code is 3 times over that of the normal QR code. Therefore, designing a Quality image-embedding 2D barcode for the customer engaging applications are a problem of practical significance. In this work, a novel image - embedding 2D barcode, called PiCode.

QR CODE

Figure – 1: *QR Code Structure*



Users will scan in codes (may be during a magazine or on a poster) employing a portable with a camera or QR reader and QR Code reader software package. The decryption

software package then interprets the code; an inventory of applications appropriate for a spread of handsets is accessible from 708 Media. Users are then supplied with a relevant URL, chunk of text, transferred to a number or sent Associate in Nursing SMS. This act of linking from physical world objects is thought as a tough link or physical world hyperlinks. After the image of a QR code is captured, it's binarized to a black and white image. Next, the detection rule is applied to the binarized image to find the 3 square finder patterns. The detection is conducted by finding out the black-white-black-white-black pattern with magnitude relation of 1:1:3:1:1 in each the horizontal and vertical directions. The position of every module is then found with regard to the alternating black and white temporal order patterns. at intervals every binarized module, the central component is employed to pull the info bit as '1' or '0' relying whether or not it's black or white. Once reception, sequences of bits are obtained. Finally, the message is recovered by reorganizing the bits in line with the header info and playing the corresponding Reed-Solomon coding.

RELATED WORK

Two-dimensional barcodes are wide employed in the mobile advertising business, whereas their decipherment performance isn't invariably satisfactory underneath uncontrolled environments. In^[1] C. Chen and W. H. Mow gift the corner detection accuracy has been known as a crucial issue poignant the general system performance. The standard barcode detector performs a candidate search within the binarized barcode image supported the oblong form of the barcode. Its performance isn't terribly correct, thanks to the restricted accuracy of the binarized image. In this work, the authors projected a coarse-fine corner detection approach for locating the barcode region. It performs much more accurately than the quality barcode detection theme whereas keeping the procedure quality cheap. Experimental results for top capability barcodes show that the planned detection theme will extend the variety of operation parameters, like wider angles, and far lower the detection bit error rate, relative to the quality barcode decoder.

In^[7] Hiroshi Hanaizumi shows that new algorithmic rule and therefore the implementations of image reorganization for EAN/QR barcodes in mobile phones. The mobile system used here consists of a camera; mobile application processor, digital signal processor (DSP), and show device, and also the supply image are captured by the embedded camera device. The introduced formula relies on the code space found by four corner detection for second barcode and spiral scanning for 1D barcode victimization the embedded DSP. This formula is powerful for sensible things and therefore the DSP has good enough performance for the period of time recognition of the codes.

In^[10] Tsung-Yu Liu aims to construct a 2D barcode and handheld increased reality supported learning system known as HELLO (Handheld English language Learning Organization), to enhance students' English level. The HELLO do integrates the 2D barcodes, the web, increased reality, mobile computing and information technologies. The projected system consists of 2 subsystems: associate degree English learning management system and a mobile learning system tools. A four-week pilot study and form, survey were conducted in school to judge the effects of projected learning system and student learning attitudes. What is more, the analysis results indicate that second barcodes and increased reality technology area unit helpful for English learning.

With the swift increase of the amount of mobile device users, a lot of wireless info services and mobile system commerce applications area unit required. Since numerous barcodes are used for (many years) as a really effective means that in many ancient commerce systems, these days individuals area unit trying to find innovative solutions to use barcodes within the wireless world. Recently, the mobile business began to pay a lot of attention to barcode applications in m-commerce as a result of 2D-barcode not solely give an easy and easy technique to gift various commerce knowledge, however conjointly improve mobile user expertise by reducing their inputs. In 1st [8] Boche Zeyu gao discusses 2D-Barcode ideas, sorts and classifications, major technology players, and applications in mobile commerce. Then, it reports a groundwork project to develop a 2D-Barcode process answer to support mobile applications. Moreover, the paper additionally presents the applying examples and case study exploitation the answer. QR codes are wide used as a way for conveyance matter data, like emails, hyperlinks, or phone numbers, through pictures that are understood employing a sensible phone camera. The codes take up valuable area in the medium.

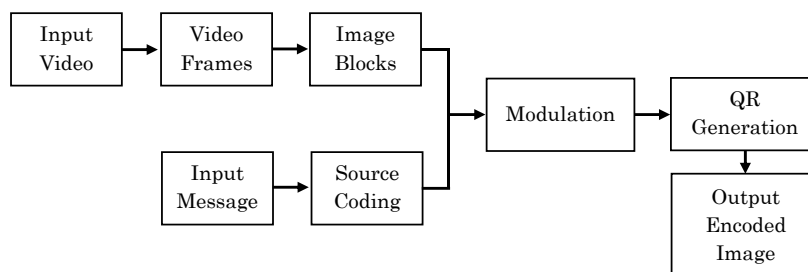
The random lack of QR codes not solely detracts from the assembly values of the advert during which they seem, however the codes are visually insignificant within the sense that an individual's cannot make out the seller, brand, or purpose of the code simply by staring at it, while not the help of scanning software system.

Though neither the aesthetics nor the visual significance for the code matter for scanning functions, they are doing matters for advertising layout and, additional significantly, will offer valuable whole distinction. In [5] Zachi Baharav shows, however the visually important QR codes are also obtained by image mixing. not like to vary ad-hoc strategies that are projected by others, our methodology leaves fully intact the error correction budget of the code.

PROPOSED FRAME WORK

A novel work adaptive the modulation theme that adapts modulation energy to the image intensity in contrast to QR code and knowledge, Matrix code within the case of high capability versions, no mounted pattern is inserted within the interior space of a PiCode therefore on avoiding the obtrusive pattern that degrades the looks of the embedded image.

Figure – 2: Block Diagram of the Proposed System for Embedding Process



We propose a coarse-fine corner detection algorithmic rule and a module alignment theme that exploits previous info on the PiCode structure to accurately find every module for reception. The conventional demodulation algorithm 1st binarizes the barcode image so samples the central compounded of every binarized module to get the demodulated bit stream decision.

The conventional reception rule 1st binarizes the barcode image so samples the central component of every binarized module to get the demodulated bit stream.

4.1 Generation Part

Video frames first converted to RGB frames and then converted to YUV frames. Embedding RGB color image is converted into a vector $P = \{p_1, p_2 \dots p_{32 \times 32}\}$ of 0 and 1. This vector P is once more divided into n components. Then every half is embedded into every of the corresponding LL and HH sub bands. The image pixels are embedded with strength x into the maximum possible coefficient M_i of every PC block Y_i . Finally, embedded frame is reconstructed and embedded video is obtained.

4.2 Embedding Image

The embedding method will be divided into 2 parts: the input process and also the PiCode generation. The first part, the input message is changed into a bit stream with input coding and channel coding to increase the efficiency and robustness of the encoded message.

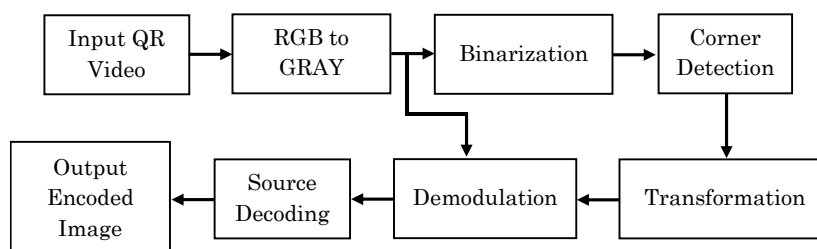
The input picture is then divided into a 2D grid of picture blocks in accordance with the user's input on the amount of modules per dimension. Every block consists of $k \times k$ pixels within the embedding system, the pixels in every picture block area unit changed by the planned adaptive.

Modulation system in order that the every image block conveys a touch '0' or '1'. Finally, a layer of finder pattern of 1 module wide is additional to the outside of the modulated 2D grid of image blocks to create the PiCode. Within the following, we tend to describe the channel coding to writing and also the modulation types that the square measure essential in equalization the decoder booming and sensory activity quality.

4.3 Extraction Process

The steps used for wavelet extraction is that the same because the steps within the embedding however within the reverse direction. As follows embedded video regenerate into frames. Every RGB frame is regenerate to YUV methods. Wavelet is applied at the sub-bands LL and HH divided into $n \times n$ non-overlapping blocks.

Figure – 3: Block Diagram of the Proposed System for Extraction Process



First, the captured video-PiCode is regenerate to grayscale and is binarized to facilitate the explore for the potential barcode regions that area unit then checked against the detection criterion. If the check is passed, the four corners area unit obtained; otherwise, the image is rejected and therefore the decoding method is changed with another image frame. Supported the barcode corner locations, the angle distortion is then calculated and remunerated on the grey level image. Finally, the message is obtained by applying channel and input decoding to the demodulated bits.

4.4 Binarization

First, the captured PiCode video is regenerate to grayscale and is binarized to facilitate the rummage around for the potential barcode regions that are then checked against the detection criterion. If the check is passed, the four corners are obtained; otherwise, the image is rejected and therefore the decoding method is re-initiated with another image frame. Supported the barcode corner locations, the attitude distortion is then calculable and reordered on the grey level image.

For the module alignment stage, the region for every PiCode module is obtained to support broken line components of the finder patterns. The subsequent reception method is that the reverse of the modulation method by inspecting the intensity variations between the inner and outer components of every module. The modulated bit in every module is retrieved by the reception operation.

Finally, the information is obtained by applying channel and input secret writing to the demodulated bits. During this half, we tend to principally cowl the corner detection, module alignment and reception steps that reflect our major contributions.

RESULT AND DISCUSSION

The above method is applied to a sample video frame sequence exploitation binary embedding. The initial sampled frame and its corresponding embedded frame seem square measure visually the image of the initial.

5.1 Performance Metrics

5.1.1 Peak Signal to Noise Ratio (PSNR)

Peak Signal to Noise Ratio (PSNR) is employed as a general calculation of the visual quality of the embedding system.

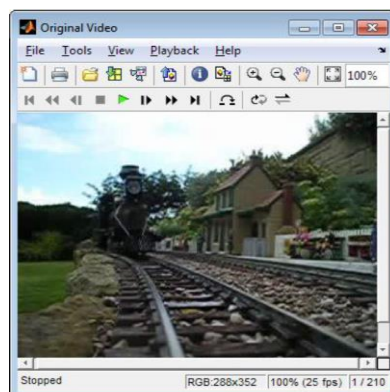
The Peak Signal To Noise Ratio (PSNR) is employed to calculate deviation of the watermarked and attacked frames from the first video frames and is outlined as:

$$\text{PSNR} = 10 \log_{10}(255^2/\text{MSE})$$

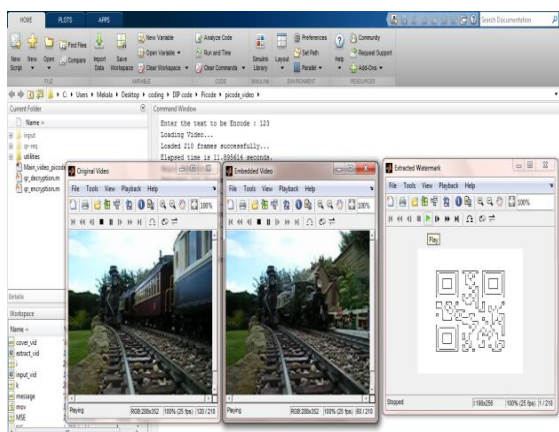
Peak signal noise, usually abbreviated PSNR, is an associate degree engineering term for the quantitative relation between the most attainable power of a symptom and therefore the power of corrupting noise that affects the fidelity of its illustration.

SIMULATION RESULTS

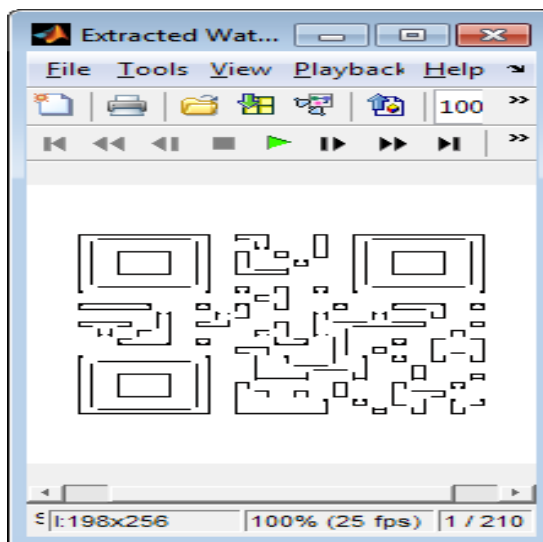
6.1 Original Video Frame



6.2 Embedding Process



6.3 Extraction Process



CONCLUSION

In this work, the video-picode is intended with less obtrusive fixed patterns to avoid distortions on the embedded image, and a modulation theme that represents the info bit worth adaptively with the embedded image intensity. On the opposite hand, some key steps of the coding method have additionally been developed to ensure the coding lustiness as well as the coarse-fine corner detection, module alignment with barcode structural info and reception with info from all pixels in every module. Here implementation of digital video embedding theme supported wavelet is projected. Because of multi-resolution characteristics of wavelet this theme is powerful against many attacks. Software package model is style by exploitation MATLAB. There's no noticeable distinction between the watermarked video frames and also the original video frames.

Comparisons with existing phase I techniques show that Video-PiCode achieves one amongst the most effective sensory activity embedded video, and maintains a more robust trade-off between video quality and decipherment hardness in varied application conditions.

REFERENCES

- [1] C. Chen & W. H. Mow, "Poster: A Coarse-fine Corner Detection Approach for Two-dimensional Barcode Decoding," in Proceedings of the International Conference on Mobile Computing and Networking, ser. MobiCom '14, 2014, pp. 351–354.
- [2] Kesavan Gopal, & M. Madhavi Latha "Watermarking of Digital Video Stream for Source Authentication" IJCSI International Journal of Computer Science Issues, 7, Issue 4, No 1, July 2010.
- [3] Salwa A.K Mostafa, A. S. Tolba, F. M. Abdelkader, & Hisham M. Elhindy, "Video Watermarking Scheme Based on Principal Component Analysis and Wavelet Transform" International Journal of Computer Science and Network Security, Vol. 9 No. 8, August 2009.
- [4] Keshav S Rawat "Digital Watermarking Schemes for Authorization Against Copying or Piracy of Color Images" Indian Journal of Computer Science and Engineering, Vol. 1 No. 4 295-300.
- [5] Z. Baharav & R. Kakarala, "Visually Significant QR Codes: Image blending and statistical analysis," in IEEE International Conference on Multimedia and Expo, July 2013, pp. 1–6.
- [6] H. Blasinski, O. Bulan, & G. Sharma, "Per-colorant-channel color barcodes for mobile applications: An interference cancellation framework," IEEE Transactions on Image Processing, Vol. 22, No. 4, pp. 1498–1511, 2013.
- [7] E. Ohbuchi, H. Hanaizumi, & L. Hock, "Barcode readers using the camera device in mobile phones," in International Conference on Cyberworlds, Nov 2004, pp. 260–265.
- [8] J. Gao, L. Prakash, & R. Jagatesan, "Understanding 2D-BarCode Technology and Applications in M-Commerce - Design and Implementation of A 2D Barcode Processing Solution," in International Computer Software and Applications Conference, Vol. 2, July 2007, pp. 49–56.
- [9] Z. Baharav & R. Kakarala, "Visually significant QR codes: Image blending and statistical analysis," in IEEE International Conference on Multimedia and Expo, July 2013, pp. 1–6.
- [10] T.-Y. Liu, T.-H. Tan, & Y.-L. Chu, "2D Barcode and Augmented Reality Supported English Learning System," in International Conference on Computer and Information Science, July 2007, pp. 5–10.
- [11] H. Yang, A. Kot, & X. Jiang, "Binarization of Low-Quality Barcode Images Captured by Mobile Phones Using Local Window of Adaptive Location and Size," IEEE Transactions on Image Processing, Vol. 21, No. 1, pp. 418–425, Jan 2012.
- [12] G. Garateguy, G. Arce, D. Lau, & O. Villarreal, "QR Images: Optimized Image Embedding in QR Codes," IEEE Transactions on Image Processing, Vol. 23, No. 7, pp. 2842–2853, July 2014.
- [13] E. Ohbuchi, H. Hanaizumi, & L. Hock, "Barcode readers using the camera device in Mobile Phones," in International Conference on Cyberworlds, Nov 2004, pp. 260–265.
- [14] J. McCune, A. Perrig, & M. Reiter, "Seeing-is-believing: using camera phones for human-verifiable authentication," in IEEE Symposium on Security and Privacy, May 2005, pp. 110–124.
- [15] Nisreen I. Yassin, Nan cy M. Salem, & Mohamed I. El Adawy "Block Based Video Watermarking Scheme Using Wavelet Transform and Principle Component Analysis" IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 1, No 3, January 2012.